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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/579,640

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EXAMINER

SRIVASTAVA, KAILASH C

ART UNIT

PAPER NUMBER

1657

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/579,640	Applicant(s) ROBERTS ET AL.	
	Examiner Kailash C. Srivastava	Art Unit 1657	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 1-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Response filed 25 February 2010 to the Office Action mailed 02 February 2010 is acknowledged and entered.

Claims Status

2. Claims 1-30 are currently pending.

Restriction/Election

3. Applicants' response and election with traverse of Group II encompassing Claims 14-30 drawn to a multistep method for further prosecution filed 25 February 2010 to the election requirement in Office Action mailed 02 February 2010 is acknowledged and entered. The traversal is on the grounds that the inventions grouped as I –II should be rejoined (See, Response filed 25 February 2010, Page 10, Lines 2-7).

- (i) Applicants are of the opinion that the 2 Groups should be rejoined and examined as one invention, because:
- (ii) the method utilizes the composition and is non-functional in absence of composition (See, Response filed 25 February 2010, Page 10, Lines 2-3);
- (iii) the two groups share the most common feature (See, Response filed 25 February 2010, Page 10, Lines 3-4); and
- (iv) "MPEP guidelines argues against restriction for the interconnectedness" as is present in Claims encompassing Groups I-II inventions (See, Response filed 25 February 2010, Page 10, Lines 6-7).

The two inventions do not share a common technical feature, where said technical feature of inter-relatedness between the two inventions is a CONTRIBUTION OVER THE PRIOR ART (37 C.F.R. §1.475).

As is of record in the Office Action mailed 02 February 2010 (Pages 2-6), group I composition is a culture medium comprising certain concentration of cations and percentage of saline (i.e., NaCl) to support bacterial growth which is well known in the relevant art (see for e.g., U.S. Patent 6,077,429, Abstract, Figures 1-3, Column 9, Line 55-Column 10, Line 37). The

special technical feature of Group II is a method to load a bioreactor with a pollutant containing stream comprising brine or wastewater and bacteria that degrade the pollutants, which again is well known in the relevant art (see, e.g., U.S. Patent U.S. Patent 6,077,429 as indicated above and additionally, Column 10, Line 38 to Column 11, References 1, 5, 7-15 and 23) and Okeke et al., (2002. Reduction of perchlorate and nitrate by salt tolerant bacteria. Environmental Pollution, Volume 118, Pages 357–363), Abstract. Page 358, Column 2, Lines 4-37; Page 358, Column 2, Line 4 to Page 359, Column 2, Line 49; Page 360, Column 1, Lines 2-37; Page 360, Column 2, Lines 1-2 and 16-36 and Figures 1-2). Accordingly, the two inventions do not share a common technical feature according to 37 C.F.R. §1.475; MPEP §1850 [R-7]. Burden is not an issue when lack of unity is established.

Applicants' arguments regarding the restriction requirements in the response filed 25 February 2010 to Office Action mailed 02 February 2010 have been carefully and fully considered but are not found persuasive because of the reasons of record at pages 2-5, items 6-9 of the Office Action mailed 02 February 2010; and for additional reasons discussed *supra*. Therefore the restriction requirement in the Office Action mailed 02 February 2010 is still deemed proper and is made FINAL.

Accordingly, Claims 1-13 are withdrawn from further consideration as being directed to a non-elected invention. See 37 C.F.R. §1.142(b) and M.P.E.P. §821.03.

4. Claims 14-30 are examined on merits.

Priority

5. Claim for domestic priority under 35 U.S.C. §119(e) to Provisional U.S. Application Serial Number 60/523,637 filed 20 November 2003 is acknowledged.

6. Claim for priority under 35 U.S.C. §371 to PCT/US04/38808 filed 19 November 2004 is acknowledged.

References Cited in 371 Application

7. The references cited in the Search Report filed 18 May 2006 as "Documents submitted with 371 Application" have been considered, but will not be listed on any

patent resulting from this application because they were not provided on a separate list in compliance with 37 C.F.R. §1.98(a)(1). In order to have the references printed on such resulting patent, a separate listing, preferably on a PTO/SB08A and 08B form, must be filed within ONE MONTH of the mailing date of this communication. NO EXTENSION OF TIME WILL BE GRANTED UNDER EITHER 37 C.F.R. §1.136(a) OR (b) to comply with this requirement.

Specification Objected

8. At page 1, first paragraph 1, the Application priority data regarding Applicants' Claim for priority to PCT/US04/38808 filed 19 November 2004 is lacking. Appropriate correction is required

Claim Rejections 35 U.S.C. §112

35 U.S.C. §112, second paragraph of

9. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

10. Claims 30 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- The limitation, "first and second ion exchange resins" in Claim 30 lacks insufficient antecedent basis for said limitation in the cited claim, because Claim 27 from which Claim 30 depends does not recite two different ion exchange resins. Appropriate correction is required

Claim Rejections - 35 U.S.C. §102/103

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. §102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. The following is a quotation of 35 U.S.C. §103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR §1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § 102(f) or (g) prior art under 35 U.S.C. § 103(a).

14. Claim 14-26 are rejected under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Logan (U.S. Patent 6,214,607 B1).

Claims 14-26 are drawn to a method to degrade at least one contaminant present in a contaminated brine stream when said stream is:

- ▲ fed to a bioreactor containing a mixed bacterial culture, wherein;
- ▲ said bacterial culture degrades under anoxic/anaerobic conditions said at least one pollutant in said brine stream;
- ▲ to said bioreactor is also added an effective quantity of a divalent cation precursor in such amount that said divalent cation quantity maintains a divalent to monovalent cation molar ratio at ≥ 0.05 ;
- ▲ said degradation of said brine stream contaminant takes place at a temperature for a duration to bring the contaminant concentration at a desired level, while divalent to monovalent cation molar ratio is maintained at ≥ 0.05 ;
- ▲ said bioreactor is sealed to eliminate/reduce oxygen;
- ▲ said reactor being sparged with an oxygen-free gas selected from nitrogen (N_2) or Argon (Ar) or mixtures thereof;
- ▲ divalent cation selected from soluble salt of:
 - Ba^{2+} , Ca^{2+} , Mg^{2+} , Sr^{2+} ; or
 - Ca^{2+} , Mg^{2+} , Sr^{2+} ; or
 - Ca^{2+} and Mg^{2+} ; or
 - is Mg^{2+} ;
- ▲ the contaminant is selected from the group perchlorate (ClO_4^{1-}) or nitrate (NO_3^{1-}) or

mixture thereof;

- ▲ nutrients comprising an inorganic, or organic nutrient source in an amount greater than a stoichiometric amount of electron required to reduce the ClO_4^{1-} and/or NO_3^{1-} contaminant present in the brine solution for sustained microbial growth;
- ▲ the inorganic energy source is selected from the group H_2 gas, a H_2 delivery chemical or mixtures thereof;
- ▲ the organic nutrients are selected from the group consisting of acetate, ethanol, lactate, methanol, or mixtures thereof; and
- ▲ the contaminated brine solution is a ClO_4^{1-} and/or NO_3^{1-} contaminated ion-exchange regenerate brine.

Regarding Claims 14-26, Logan teaches degradation of ClO_4^{1-} in a brine solution, comprising per liter of deionized water: 5.85 mg of NaCl, 6.5 mg of MgSO_4 , 4.3 mg of $\text{CaSO}_4 \bullet 2\text{H}_2\text{O}$ and 48.0 mg of CaCO_3 with 100 mg acetate, nitrogen and phosphorus (Example 1; Column 8, Lines 40-45). Logan further teaches that degradation studies for said ClO_4^{1-} contained in said brine solution was carried out in crimp-topped serum vials (i.e., bioreactors), whose head space was purged with N_2 gas, said bioreactors inoculated with ClO_4^{1-} degrading mixed microbial consortium and the degradation was carried out for 7 days at room temperature. In 4 days, 39% ClO_4^{1-} was removed (Example 1; Column 8, Lines 25-40). Subsequently column reactors were inoculated with the same microbial consortium wherein the column reactors contained the same ClO_4^{1-} containing brine solution described *supra* (Example 1; Column 8, Lines 40-45). Logan further teaches that the pH of the column was in range of 5.0-8.0, the column temperature 10 °C to 30 °C to keep bacterial cells viable and active, and the system is comprised of an "oxidizable substrate serving as electron donor. Oxidizable substrates include acetate, ethanol, methanol and hydrogen gas (Column 6, Lines 8-20). Based on the concentrations of each of NaCl, MgSO_4 , $\text{CaSO}_4 \bullet 2\text{H}_2\text{O}$ and CaCO_3 said brine solution has a divalent to monovalent cation ratio of 0.1060. Thus, Lawrence et al., teach each and every limitation: H_2 gas as an inorganic nutrient, acetate, methanol, or ethanol as an organic nutrient, purging with N_2 gas, ClO_4^{1-} -contaminated brine solution having divalent to monovalent cation ratio of 0.1060 (i.e., ≥ 0.05), and 39% degradation of ClO_4^{1-} of the invention claimed in Claims 14-26.

Therefore, the reference is deemed to anticipate the cited claims.

However, even if the reference and the claimed method are not one and the same and there is, in fact, no anticipation, the reference method would, nevertheless, have rendered the claimed method obvious to one of ordinary skill in the art at the time the claimed invention was made in view of the fact that the reference teaches same materials and same steps. The only difference between the reference method and the instantly claimed invention resides in the concentrations of contaminant. Nevertheless, the reference method (i.e., Logan) teaches each and every component and each of the method steps as instantly claimed and within the range of the materials instantly claimed. Additionally, if there is any guidance in the reference regarding the concentration range of a material as is presented for each one of cations (e.g., Ca^{2+} and Mg^{2+}) and ClO_4^{1-} from Logan; the adjustment of particular conventional working equivalents (e.g., concentration) is deemed merely a matter of judicious selection and routine optimization of a result-effective parameter that is well within the purview of the skilled artisan for which the Examiner –cited reference has provided some guidance.

Thus, the claimed invention as a whole was clearly *prima facie* obvious especially in the absence of sufficient, clear and convincing evidence to the contrary.

From the teachings of the reference cited *supra*, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Claim Rejections - 35 U.S.C. § 103

16. Claims 27-30 are rejected under 35 U.S.C. §103 (a) as obvious over the combined teachings from Logan (U.S. Patent 6,214,607 B1) in view of Venkatesh et al (U.S. Patent 6,066,257).

Claims 27-30 are drawn to a method to degrade at least one contaminant present in a contaminated brine stream when said stream is:

- fed to a bioreactor containing a mixed bacterial culture, wherein;
- said bacterial culture degrades under anoxic/anaerobic conditions said at least one pollutant in said brine stream;
- the column resin in said reactor is exhausted, or is not able to remove the

contaminant, the flow of contaminant-containing brine is stopped to said reactor, or fed to a second reactor, while the resin in the first column is recharged with the addition of a divalent cation solution to maintain the divalent to monovalent cation molar ratio at ≥ 0.05 .

Regarding Claims 27-30, teachings from Logan have been discussed *supra*. Logan however, is silent regarding switching the reactors or regeneration of column resin.

Venkatesh et al., teach that the units employed in Venkatesh et al's method steps have a regeneration zone, wherein the low concentration brine is used as regenerant. Then the waste stream comprising perchlorate containing brine is treated in a bioreactor and the resulting stream is recycled (Abstract). Thus, Venkatesh et al' method remedies the discrepancy of column/resin regeneration step in Logan's method.

One having ordinary skill in the art at the time of the claimed invention would have been motivated to modify/combine the teachings from Logan with those of Venkatesh et al., to obtain a method wherein the column/resin incapacitated of removing the perchlorate contaminant from the brine would be regenerated; because Venkatesh et al., teach regeneration of columns/resins and refeeding the perchlorate-contaminated brine to said regenerated columns/resins.

It would have been *prima facie* obvious to a person of ordinary skill in the art at the time the claimed invention was made to combine the teachings from Logan with those of Venkatesh et al., to obtain a method wherein the column/resin incapacitated of removing the perchlorate contaminant from the brine would be regenerated; because Venkatesh et al., teach regeneration of columns/resins and refeeding the perchlorate-contaminated brine to said regenerated columns/resins. The recited prior art may be silent regarding the exact technique as are instantly claimed, however, since similar steps and same components and principle are described in the prior art references, application of those parameters and steps is deemed merely a matter of judicious design selection of a result-effective parameter which is well within the purview of the skilled artisan especially with the relevant art from the cited references before him/her as a guide (See, e.g., M.P.E.P. §2144.06) and is therefore obvious under 35 U.S.C. §103(a).

From the teachings of the cited references, it is apparent that one of ordinary skill in the art would have had a reasonable expectation of success in producing the claimed invention. Therefore, the invention as a whole was *prima facie* obvious to one of ordinary skill in the art at the time the invention was made, as evidenced by the references, especially in the absence of evidence to the contrary.

Conclusion

17. For the aforementioned reasons, no claims are allowed.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Kailash C. Srivastava whose telephone number is (571) 272-0923. The examiner can normally be reached on Monday to Thursday from 7:00 A.M. to 5:30 P.M. (Eastern Standard or Daylight Savings Time).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jon P. Weber can be reached at (571)-272-0925 Monday through Thursday 8:00 A.M. to 6:00 P.M. and on Fridays between 7:30 A.M. to 4:30 P.M. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding may be obtained from the Patent Application Information Retrieval (i.e., PAIR) system. Status information for the published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (i.e., EBC) at: (866)-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ Kailash C Srivastava/
Examiner, Art Unit 1657

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21 May 2010

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